

WHAT IS CLAIMED IS:

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2 1. A composition for use in producing an investment casting shell, the
3 composition comprising:

4 a slurry having a plurality of particles of varying size; and

5 wherein some of the particles are larger than 100 mesh.

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1 2. The composition of claim 1, wherein the slurry includes colloidal silica.

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1 3. The composition of claim 2, wherein the colloidal silica is 40% colloidal
2 silica.

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1 4. The composition of claim 1, wherein the slurry includes zircon flour.

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1 5. The composition of claim 4, wherein the zircon flour is in a range of about
2 200 mesh to 350 mesh.

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1 6. The composition of claim 5, wherein the zircon flour is about 325 mesh.

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1 7. The composition of claim 1, wherein the slurry includes fused silica.

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1 8. The composition of claim 7, wherein the fused silica is in a range of about
2 90 mesh to 150 mesh.

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1 9. The composition of claim 8, wherein the fused silica is about 120 mesh.

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1 10. The composition of claim 8, wherein the fused silica is in a range of 12%
2 to 22% of the slurry by weight.

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1 11. The composition of claim 1, wherein the slurry includes silicon carbide.

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1 12. The composition of claim 11, wherein the silicon carbide is in a range of
2 about 100 mesh to 300 mesh.

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1 13. The composition of claim 12, wherein the silicon carbide is about 200
2 mesh.

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1 14. The composition of claim 12, wherein the silicon carbide is in a range of
2 about 6% to 12% of the slurry by weight.

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1 15. The composition of claim 1, wherein the slurry includes a non-reactive
2 refractory.

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1 16. The composition of claim 15, wherein the refractory is fritted.

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1 17. The composition of claim 15, wherein the refractory is in a range of about
2 180 mesh to 240 mesh.

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1 18. The composition of claim 17, wherein the refractory is about 200 mesh.

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1 19. The composition of claim 18, wherein the refractory is Mulcoa 60.

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1 20. The composition of claim 1, wherein the slurry includes alumina.

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1 21. The composition of claim 20, wherein the alumina is tabular alumina that
2 is about 325 mesh.

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1 22. The composition of claim 1, wherein the slurry includes perlite.

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1 23. The composition of claim 1, wherein the slurry includes a thickening
2 agent.

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1 24. The composition of claim 23, wherein the the thickening agent is corn
2 starch.

3

1 25. The composition of claim 24, whereinthe slurry includes a feldspathic
2 filler.

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- 1 26. The composition of claim 23, wherein the feldspathic filler is perlite.
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- 1 27. The composition of claim 1, wherein the slurry includes frit 3124.
2
- 1 28. The composition of claim 1, wherein the slurry includes a plaster
2 component.
3
- 1 29. The composition of claim 28, wherein the plaster component is Plaster of
2 Paris.
3
- 1 30. The composition of claim 1, wherein the slurry includes HP4.
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- 1 31. The composition of claim 30, wherein the HP4 is sieved with a 4 mesh
2 sieve.
3
- 1 32. The composition of claim 1, wherein the slurry includes a liquid
2 refractory.
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- 1 33. The composition of claim 1, wherein the liquid refractory is colloidal
2 silica (40%), and wherein the slurry further includes zircon flour and fused silica.
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- 1 34. The composition of claim 33, wherein the slurry includes silicon carbide.
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1 35. The composition of claim 1, wherein a viscosity of the slurry is greater
2 than about 2500 centipoise (cps).
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1 36. The composition of claim 35, wherein the viscosity is greater than about
2 10,000 cps.
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1 37. The composition of claim 36, wherein the viscosity of the slurry is greater
2 than about 100,000 cps.
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2 38. A composition for use in producing an investment casting shell, the
3 composition comprising:

4 a slurry having a viscosity greater than 2500 cps.

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1 39. The composition of claim 38, wherein the viscosity is greater than 10,000
2 cps.

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1 40. The composition of claim 39, wherein the viscosity is greater than 100,000
2 cps.

3

1 41. The composition of claim 38, wherein the slurry includes colloidal silica,
2 fused silica and zircon flour.

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1 42. The composition of claim 41, wherein the slurry further includes silicon
2 carbide.

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1 43. The composition of claim 38, wherein the slurry includes particles of
2 varying size, wherein some of the particles are larger than 100 mesh.

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1 44. A composition for use in producing an investment casting shell, the
2 composition comprising:
3 a slurry including HP4.

4

1 45. The composition of claim 43, wherein the slurry has particles of varying
2 size, wherein some of the particles are greater than 100 mesh.

3

1 46. The composition of claim 44, wherein the HP4 is sieved with a 4 mesh
2 sieve.

1 47. The composition of claim 46, wherein the slurry further includes
2 fused silica and colloidal silica.

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1 48. The composition of claim 47, wherein the slurry further includes a
2 thickening agent.

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1 49. The composition of claim 48, wherein the slurry further includes a
2 feldspathic filler.

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1 50. The composition of claim 46, wherein the slurry includes a liquid
2 refractory.

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1 51. A composition for use in producing an investment casting shell, the
2 composition comprising:
3 a slurry, wherein the slurry is usable for at least six hours without
4 generally continuous agitation.

1 52. The composition of claim 51, wherein the slurry includes particles of
2 varying size, and wherein some of the particles are greater than 100 mesh.

1 53. The composition of claim 51, wherein the slurry has a viscosity greater
2 than about 2500 centipoise (cps).

1 54. The composition of claim 53, wherein the viscosity is greater than about
2 10,000 cps.

1 55. The composition of claim 54, wherein the viscosity is greater than about
2 100,000 cps.

1 56. The composition of claim 52, wherein the slurry includes zircon flour.

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1 57. A method of investment casting of a pattern, the method comprising the
2 steps of:

3 applying a shell material slurry to the pattern, wherein the slurry includes
4 particles of varying size, and wherein some of the particles being greater than about 100
5 mesh.

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1 58. The method of claim 57, wherein the slurry has a viscosity greater than
2 about 2500 centipoise (cps).

3

1 59. The method of claim 58, wherein the viscosity is greater than about
2 10,000 cps.

3

1 60. The method of claim 59, wherein the viscosity is greater than 100,000 cps.

2

1 61. The method of claim 57, further comprising the steps of:
2 allowing the applied slurry to harden into a shell; and
3 filling the shell with a molten metal in less than about twenty-four (24)
4 hours from completion of said applying step.

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1 62. The method of claim 61, wherein said filling step is performed in less
2 than about six hours from completion of said applying step.

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1 63. The method of claim 61, further comprising melting the pattern from the
2 shell prior to said filling step.

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2 64. An investment casting method comprising the steps of:
3 applying a shell material to a pattern;
4 allowing the coated pattern to harden into a shell to create a coated
5 pattern;
6 removing the pattern from the shell;
7 filling the shell with a molten metal;
8 allowing the molten metal to solidify into an article;
9 removing the shell from the article; and
10 wherein the shell material is a slurry including colloidal silica, zircon
11 flour, and fused silica.

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1 65. A method of casting comprising the steps of:
2 applying a face coat to a pattern;
3 allowing the face coat to at least partially dry;
4 coating the pattern with a slurry composition to create a coated pattern;
5 allowing the coated pattern to harden into a shell;
6 filling the shell with a molten metal;
7 allowing the molten metal to solidify into an article; and
8 removing the shell from the article.

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1 66. The method of claim 65, wherein the pattern is made from a material with
2 a lower melting temperature than the shell.
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1 67. The method of claim 65, wherein said coating step is performed by
2 brushing.
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1 68. The method of claim 65, wherein the face coat operates to minimize
2 oxidation on an inside surface of the shell.
3

1 69. The method of claim 65, further comprising removing the pattern
2 generally simultaneously with said filling step.
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1 70. The method of claim 65, wherein the face coat includes:
2 colloidal silica;
3 zircon flour; and
4 fused silica.
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6 71. The method of claim 70, wherein the face coat further includes latex
7 colloidal silica.
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1 72. The method of claim 71, wherein the face coat further includes corn
2 starch.
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1 73. The method of claim 65, wherein said filling step is performed in less than
2 twenty-four hours from completion of said coating step.

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1 74. The method of claim 73, wherein said filling step is performed in less than
2 six hours from completion of said coating step.